

Atmospheric CO₂ Observations from Space (ACOS)
Level 2 Data Quality Statement:
Data Release 9 (V9)
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The Orbiting Carbon Observatory (OCO-2, OCO-3) team has released the version 9 (V9) of the Level 2 (L2) Atmospheric CO₂ Observations from Space (ACOS) data product. The ACOS data product uses the OCO-2 retrieval algorithm to generate column averaged dry air mole fraction (X_{CO₂}) and other geophysical quantities retrieved from the Greenhouse Gases Observing Satellite (GOSAT) mission observations. With this version there is now over 10 years of X_{CO₂} data from the ACOS/GOSAT collaboration.

The ACOS V9 data uses the OCO-2 retrieval algorithm with some adjustments for the difference in the instrument properties of GOSAT and OCO-2. The updates to the algorithm and calibration included in V9 include:

- Latest version of the GOSAT L1B radiances (V205205, V210210)
 - V205 (April 2009 to February 2018)
 - V210 (March 2018 to December 2019)
- Trace gas spectroscopic parameters used in the retrieval algorithm (ABSCO V5.0)
- Meteorological a priori information (GEOS5 FP-IT)
- *a priori* information for aerosols and CO₂
- Updated bias correction parameters for both land and ocean retrievals
- Land M-gain retrievals included in data set

The OCO-2 XCO₂ measurements are tied to the World Meteorological Organization's CO₂ standard by comparison with ground-based observations from the Total Carbon Column Observation Network (TCCON). The OCO-2 validation plan was first described before launch in an analysis using TCCON and XCO₂ estimates from ACOS V2.8 (Wunch et al, 2011b). The comparisons of the satellite data to the TCCON data continues to be fundamental to the validation of ACOS, OCO-2 and OCO-3 data, and establishing global bias correction factors for each data stream. The updated comparisons of ACOS data V9 to TCCON will be made available soon.

In addition to comparisons to TCCON, the ACOS V9 data has been compared to a multi-model mean estimate of XCO₂. Aggregating estimates from multiple atmospheric models provides an estimate of changes in patterns of bias of XCO₂ on the global scale. Figure 1 below illustrates the differences in the V9 ACOS Level 2 data compared to the median estimate from multiple models. These comparisons confirm a decrease in bias and standard deviation of these differences with the newer V9 data set.

More information about using the ACOS V9 Level 2 data is provided in the ACOS Data User's Guide which is available at the ACOS page at the Goddard Earth Sciences Data and Information Services Center (GES DISC).

References

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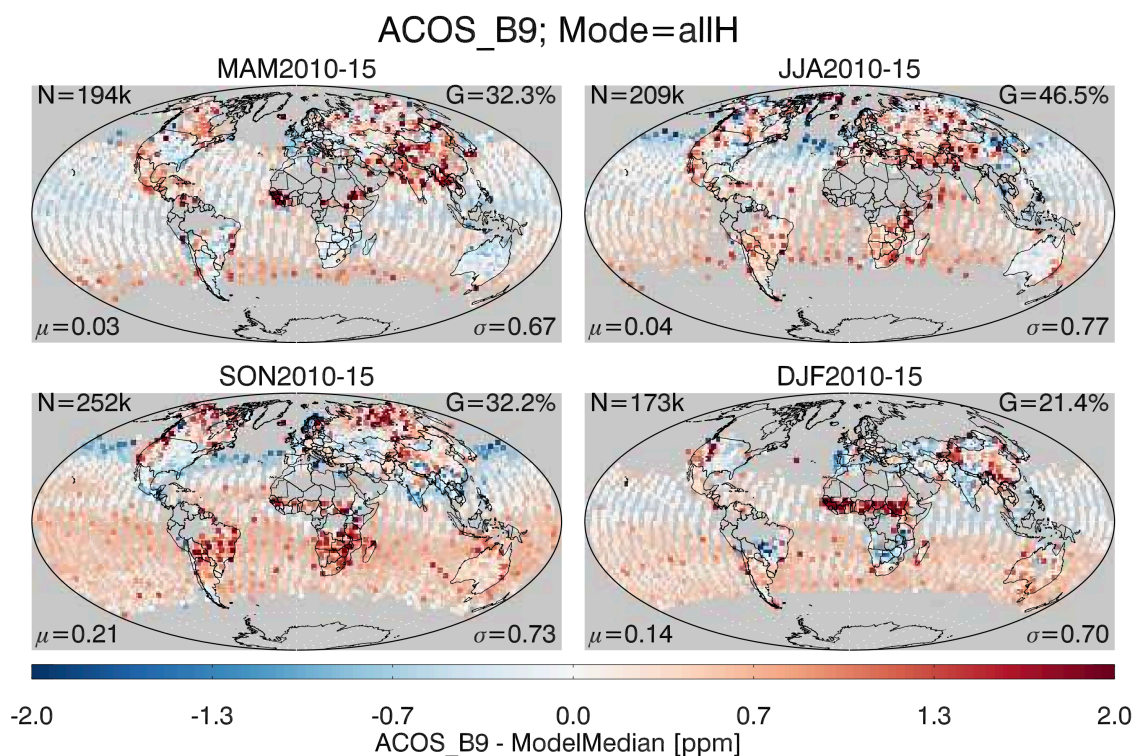


Figure 1. Difference between ACOS V9 data from 2010 – 2017 and an aggregation (median) of model results. Preliminary comparisons suggest that differences between the data and multi-model median have been reduced for V9 compared to V7.3 data.

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